

CLAIMS

1. An expansion valve for arrangement in a refrigerant circuit of a refrigerating apparatus, the
5 expansion valve comprising:

a valve chamber;

an inlet, formed in the valve chamber and connected to an upstream refrigerant pipe, for drawing a refrigerant flow into the valve chamber;

10 an outlet, formed in the valve chamber and connected to a downstream refrigerant pipe, for discharging the refrigerant flow from the valve chamber;

a refrigerant passage formed between the inlet and outlet in the valve chamber;

15 an orifice for variably controlling the flow rate of the refrigerant flow in the refrigerant passage; and

a turbulent portion for causing turbulence in the refrigerant flow in the refrigerant passage upstream of the orifice.

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2. The expansion valve according to claim 1, wherein the orifice includes a valve seat, which is formed in the valve chamber and has a valve hole, and a valve element for adjusting an open amount of the valve hole.

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3. The expansion valve according to claim 2, wherein the turbulent portion is formed by ridges and valleys in either one of an inner surface of the valve chamber or an outer surface of the valve element.

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4. The expansion valve according to claim 3, wherein the turbulent portion is formed in the outer surface of the valve element.

5. The expansion valve according to claim 3,
wherein the turbulent portion is formed in the inner surface
of the valve chamber.

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6. The expansion valve according to claim 4 or 5,
wherein the turbulent portion is a spiral groove.

7. The expansion valve according to claim 1,
10 wherein the turbulent portion is formed by a meandering
passage formed by meandering the refrigerant passage
upstream of the orifice between the valve element and the
valve seat.

15 8. The expansion valve according to claim 7,
wherein the meandering passage includes an axial passage,
which guides the refrigerant flow in an axial direction of
the valve element between the valve element and a wall
surface of the valve chamber, and an oblique passage, which
20 obliquely changes the direction of the refrigerant flow from
the axial passage.

9. The expansion valve according to claim 8,
wherein the oblique passage is formed by a recess formed in
25 a distal surface of the valve element and a projection
formed in the valve seat, the recess and the projection
having opposed, spaced surfaces extending substantially
parallel to each other.

30 10. The expansion valve according to claim 1,
wherein the turbulent portion includes a gap for varying a
cross-sectional area of the refrigerant passage.

11. The expansion valve according to any one of claims 1 to 6, wherein the refrigerant passage includes a gap enlarging a passage cross-sectional area between the turbulent portion and the orifice.

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12. The expansion valve according to any one of claims 1 to 9, wherein the turbulent portion is formed upstream and downstream of the valve seat in the refrigerant passage.

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13. The expansion valve according to claim 12, wherein the valve element and the valve chamber are formed upstream and downstream of the valve seat in the refrigerant passage, the turbulent portion is formed in an inner wall 15 surface of each of the valve chambers or an outer surface of each of the valve elements, and the two valve elements are connected by a shaft extending through the valve hole of the valve seat.

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14. A refrigerating apparatus employing the expansion valve according to any one of the claims 1 to 5 and 6 to 13.